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**Emerging Lithographic Technologies VI** **Roxann L. Engelstad**
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Title: **"At-wavelength inspection of defect smoothing in EUVL masks"**

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**Oral/Poster Presentation**

**Abstract:**
A reflective mask architecture is proposed for extreme ultraviolet lithography (EUVL), consisting of absorber patterns on top of a multilayer reflector. Mask blank defects are one of the major technical concerns, because defects under or in the middle of the multilayer coating stack are thought to be difficult to repair. However, it has recently been observed that the effects of small substrate particle defects on the EUVL mask substrate could be smoothed out after multilayer deposition, under certain deposition conditions.

In previous publications, we have reported on an at-wavelength EUVL mask blank defect inspection system operating at EUV wavelength (11-15 nm) based on

scanning the mask blank under a focused beam from a synchrotron radiation source while detecting both the specularly reflected light as well as scattered EUV radiation. Through cross correlation experiments with visible inspection tools, it has been demonstrated that the current at-wavelength inspection tool can detect sub-50 nm defects.

Recently, our actinic inspection tool had detected the 60 nm high and 130 nm wide (FWHM) smoothed defects, which were originally 100 nm gold spheres before multilayer coating. Now we are trying to extend our experiment into the smaller smoothed defect and the actinic inspection of other defect-compensating techniques. In this paper, we will discuss the results of actinic inspection of smoothed mask blank defects and certain compensated defects.

**Keywords:** Extreme Ultraviolet Lithography, Mask, defect inspection, at-wavelength

**Biography of Moonsuk Yi:**
Moonsuk Yi obtained his B.S., M.S., and Ph.D. from Pohang University of Science and Technology (POSTECH) Korea, in 1991, 1995 and 1999 in electrical engineering. His graduate research centered on the mask fabrication of proximity x-ray lithography and the proximity effects in PXL. He joined the Lawrence Berkeley National Laboratory in 1999 and is currently working on extreme ultraviolet lithography (EUVL) mask blank defect inspection as a staff scientist.